

REMARKS

In support of allowance, applicants have the following comments. Claims 1-5 and 7 remain pending in this application.

I. Affidavit Under Section 1.130

Enclosed is an affidavit under Section 1.130 that includes a statement that the cited Neri et al Publication No. 2002/0131062 and the instant application Serial No. 10/728,048 are commonly owned by the same entity, namely, Key-Tech, Inc. of Warwick, Rhode Island. Applicant submits that this Affidavit is now proper under Section 1.130 and that Neri et al Publication No. 2002/0131062 should be disqualified as a prior art reference.

II. Rejection of Claims Under Section 103

Each of the rejections under Section 103 rely on Neri et al. 2002/0131062. A second set of rejections under Section 103 rely alternatively on newly cited Neri et al. WO 02/072301. For ease of discussion herein, applicant will refer to both Neri et al. 2002/0131062 and Neri et al. WO 02/072301 collectively as "Neri et al." The arguments against the citation of Neri et al. 2002/0131062 will be identical to the arguments against the citation of Neri et al. WO 02/072301

A. Claims 1, 4, 5 and 7 (Neri et al, Usuki et al and Rees)

The office action states that Neri et al. teaches the claimed invention but does not teach the specific type of SURLYN composition required by the instant claims. Usuki is cited for the teaching of a substrate sheet and dye receptor layer where the substrate sheet includes an ionomer film. Rees teaches that ionomer films can be SURLYN of the

composition required by claim 1. The office action asserts that these references are combinable together to arrive at applicant's invention.

Applicants' claimed invention is directed to a method of applying a dye image to the surface of three dimensional object where a flexible dye image sheet includes a dye-receptive coating to receive a dye image thereon. The transfer element sheet is placed over the object and a flexible membrane provides a vacuum and heat is applied to cause the dye to transfer to the object. To achieve superior results over prior art methods of printing to non-flat three dimensional objects, a new transfer element construction is provided and employed in the instant method, which is set forth in detail in independent claim 1 in subsection (b) thereof. This new dye image carrier sheet is formulated to be flexible so that it may conform to a three dimensional object, such as to three sides, under the strain of vacuum pressure and heat.

Applicants' submit that the combination proposed by the examiner is untenable and is the result of hindsight reconstruction of applicants' invention. First, the office action states that it would be obvious to combine the teaching of Neri et al. with Usuki et al. and Rees. Applicants disagree. Neri et al. teaches a method of printing an image onto a three-dimensional surface where the supporting base film can be a polyester or polymer material or variations thereof. However, Neri et al. does not specifically call for an ionomer film, namely a SURLYN composition.

Usuki et al. teaches the use of ionomers as a possible base substrate for a thermal transfer dye-receptive sheet. However, Usuki et al's transfer sheet is used in an environment and for a purpose that is very different than that disclosed in Neri et al.

and in the present invention. More specifically, Usuki et al. employs an ionomer carrier film for printing using the thermal head of a printer as the heating means for transferring large number of dots to an image receiving sheet. Thus, Usuki et al. is clearly meant for printing photographs and other two dimensional images. In this environment, the transfer element is not placed under strain as it is simply passed underneath a thermal print head. Usuki's transfer element need not be flexible. Usuki et al is devoid of any teaching that the transfer element is flexible and capable of conforming about an object when subject to a vacuum and heat. This is completely unlike the three-dimensional printing about an object, such as onto multiple surfaces where none of them are in the same plane, as described in detail in applicants' specification.

There is no suggestion or teaching in Usuki et al. or Neri et al. to suggest that the substrate sheet of Usuki et al. is capable of being used in a three dimensional printing environment. Applicant submits that the formulation and construction of Usuki et al's substrate sheet is not suitable for such three-dimensional conformation for three-dimensional printing. Applicant submits that Neri et al. could not employ the base element of Usuki et al. in a three dimensional environment because such an element would not work properly for three-dimensional transfer because it would not be flexible enough and would not sufficiently absorb radiation, such as infrared, like applicants' element would to protect the underlying object. Moreover, Usuki et al. fails to teach the use of the specific material claimed by applicants, such SURLYN.

Rees is also cited for the general teaching of the existence of SURLYN. The office action merely states that Rees teaches an ionomer film known as SURLYN with a chemical composition similar to that disclosed in claim 1 in the instant application. Applicant does not dispute that SURLYN or the specific composition in claim 1 already exists in the industry of polymers. What applicant does dispute is the use as a critical part of a three dimensional thermal printing method. The cited prior art references are completely devoid of any teaching, suggestion or motivation for employing the specific composition of SURLYN as a film layer as a transfer element in three dimension thermal printing.

In view of the foregoing, Neri et al. is not combinable with Usuki et al. and Rees to arrive at applicants' invention in claims 1, 4, 5 and 7. Therefore, applicant submits that the rejection of claims 1, 4, 5 and 7 under Section 103(a) cannot be maintained and that claims 1, 4, 5 and 7 are patentable over the cited art.

B. Claims 1, 2, 5, 6 and 7 (Hastie, Usuki et al, Rees and Neri et al.)

The office action states that claims 1, 2, 5, 6 and 7 are rejected under Section 103(a) as being unpatentable over the combination of Hastie et al. in view of Usuki et al., Rees and Neri et al.

The office action asserts that Hastie et al. teach a method of printing an image onto a three-dimensional surface where a printed transfer element is placed over the object for transfer thereto using heat and vacuum. However, Hastie et al. is devoid of the particular composition required by the claims of the present invention. Usuki et al. and Rees are cited for purposes of teaching the use of an ionomer film (such as SURLYN)

and Durand is cited for the teaching of transfer printing using radiant heating elements for transfer of the dye to article. It is stated that it would be obvious for Hastie et al to use the transfer element composition of Usuki et al. and Rees and the transfer printing method of Durand to arrive at applicants' invention.

Applicants' claimed invention is directed to a method of applying a dye image to the surface of three dimensional object where a flexible dye image sheet includes a dye-receptive coating to receive a dye image thereon. The transfer element sheet is placed over the object and a flexible membrane provides a vacuum and heat is applied to cause the dye to transfer to the object. To achieve superior results over prior art methods of printing to non-flat three dimensional objects, a new transfer element construction is provided and employed in the instant method, which is set forth in detail in independent claim 1 in subsection (b) thereof. This new dye image carrier sheet is formulated to be flexible so that it may conform to a three dimensional object, such as to three sides, under the strain of vacuum pressure and heat.

Applicants' submit that the combination proposed by the examiner is untenable and is the result of hindsight reconstruction of applicants' invention. First, the office action states that it would be obvious to combine the teaching of Hastie with Usuki et al. and Rees. Applicants disagree. Hastie teaches a method of printing an image onto a three-dimensional surface where the supporting base film is amorphous poly ethylene terphthlate rather than the ionomer (SURLYN) base film as claimed in applicants' claim 1.

Usuki et al. teaches the use of ionomers as a possible base substrate for a thermal transfer dye-receptive sheet. However, Usuki et al's transfer sheet is used in an environment and for a purpose that is very different than that disclosed in Hastie and in the present invention. More specifically, Usuki et al. employs an ionomer carrier film for printing using the thermal head of a printer as the heating means for transferring large number of dots to an image receiving sheet. Thus, Usuki et al. is clearly meant for printing photographs and other two dimensional images. In this environment, the transfer element is not placed under strain as it is simply passed underneath a thermal print head. Usuki's transfer element need not be flexible. Usuki et al is devoid of any teaching that the transfer element is flexible and capable of conforming about an object when subject to a vacuum and heat. This is completely unlike the three-dimensional printing about an object, such as onto multiple surfaces where none of them are in the same plane, as described in detail in applicants' specification.

There is no suggestion or teaching in Usuki et al. or Hastie to suggest that the substrate sheet of Usuki et al. is capable of being used in a three dimensional printing environment. Applicant submits that the formulation and construction of Usuki et al's substrate sheet is not suitable for such three-dimensional conformation for three-dimensional printing. Applicant submits that Hastie could not employ the base element of Usuki et al. in a three dimensional environment because such an element would not work properly for three-dimensional transfer because it would not be flexible enough and would not sufficiently absorb radiation, such as infrared, like applicants' element

would to protect the underlying object. Moreover, Usuki et al. fails to teach the use of the specific material claimed by applicants, such SURLYN.

Rees is also cited for the general teaching of the existence of SURLYN. The office action merely states that Rees teaches an ionomer film known as SURLYN with a chemical composition similar to that disclosed in claim 1 in the instant application. Applicant does not dispute that SURLYN or the specific composition in claim 1 already exists in the industry of polymers. What applicant does dispute is the use as a critical part of a three dimensional thermal printing method. The cited prior art references are completely devoid of any teaching, suggestion or motivation for employing a SURLYN film layer as a transfer element in three dimension thermal printing.

For example, the cited Hastie reference employs a sheet of amorphous poly ethylene terephthlate as part of its transfer sheet (see page 3, lines 22-23). This material is completely different with different physical properties than the composition found in SURLYN. There is no suggestion or teaching in Hastie why it would want to swap out poly ethylene terephthlate and replace it with a SURLYN-like material. There is no suggestion or teaching in Hastie why it would want to use SURLYN for its flexibility and infrared absorbing characteristics. Similarly, none of the other cited reference include a teaching or suggestion to support the use of SURLYN in this particular application of three dimensional thermal printing.

Neri et al. is also cited for the teaching of establishing a vacuum, heating the membrane, image carrier sheet and object by radiating elements in a substantially U-shaped configuration to cause the image to transfer. Since the above references

cannot be combined under Section 103, applicant submits that a combination of references that further adds Neri et al. is also not tenable under Section 103. Thus, Neri et al. is not combinable with Hastie, Usuki et al. and Rees.

In view of the foregoing, Hastie is not combinable with Usuki et al., Rees and Neri et al. to arrive at applicants' invention in claims 1, 2, 5, 6 and 7. Therefore, applicant submits that the rejection of claims 1, 2, 5, 6 and 7 under Section 103(a) cannot be maintained and that claims 1, 2, 5, 6 and 7 are patentable over the cited art.

C. Claim 2 (Neri et al., Usuki et al, Rees and Williams)

Williams is further cited for the teaching of a barrier layer, as required by claim 2. As per above, the combination of Neri et al., Usuki and Rees cannot be maintained. Therefore, the combination of references under Section 103 with the further addition of Williams also cannot be maintained.

Claim 2 is dependent on now allowable claim 1. Therefore, applicant submits that claim 2 is now also allowable.

D. Claim 3 (Neri et al., Usuki et al, Rees and Narita et al.)

Narita et al. is further cited for the teaching of a binder and pigment, as required by claim 3. As per above, the combination of Neri et al., Usuki and Rees cannot be maintained. Therefore, the combination of references under Section 103 with the further addition of Narita et al. also cannot be maintained.

Claim 3 is dependent on now allowable claim 1. Therefore, applicant submits that claim 3 is now also allowable.

E. Claim 4 (Neri et al., Usuki et al., Rees, Durand, Gibbs et al.)

Gibbs is further cited for the teaching of a flexible membrane made of silicone rubber, as required by claim 4. As per above, the combination of Neri et al., Usuki, Rees and Durand cannot be maintained. Therefore, the combination of references under Section 103 with the further addition of Gibbs et al. also cannot be maintained.

Claim 4 is dependent on now allowable claim 1. Therefore, applicant submits that claim 4 is now also allowable.

III. Conclusion

In view of the above, Applicants submit that pending claims 1-5 and 7 are now in condition for allowance. Reconsideration of the Rejections are requested. Allowance of claims 1-5 and 7 at an early date is solicited.

If an extension of time is required for timely submission of this response, Applicant hereby petitions for an appropriate extension of time and the Office is authorized to charge Deposit Account 02-0900 for the appropriate additional fees in connection with the filing of this response.

The Examiner is invited to telephone the undersigned should any questions arise.

Respectfully submitted,

/david r. josephs/

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